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AUTHOR Worland, Julien; And Others
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ABSTRACT

Retrospective studies of the intellectual performances of children who later became psychotic adults have yielded evidence of early interference in the development of intelligence in future schizophrenics. The intellectual assessments of 153 children were examined during two test periods in the St. Louis Risk Research Project. In 1967-1972, the Wechsler tests of intelligence were administered to offspring in families with one schizophrenic parent, one parent with affective disorder, one parent with schizoaffective disorder, one physically ill parent, or to offspring with two normal parents. In 1975-1978, the intelligence of offspring was tested again at a mean age of 16 years. Differences between children as a function of parental diagnoses were assessed and yielded significant time effects. Children of schizophrenics and children of parents with affective or physical disorders had greater loss in verbal IQ scores between the first and second testing than did the children of schizoaffectives and children of normal parents. Offspring of psychotic mothers had lower IQ scores than those of psychotic fathers. Children of schizophrenics and children of schizoaffectives had the lowest stability in IQ scores from the first to second testing. The findings suggest a need for further replication research on the effects of ill parents on their children. (Author/JAC)

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Long-Term Changes in Intelligence in Children at Risk

Julien Worland, David G. Weeks, Steven M. Weiner, and Judith Schechtman[1]

Washington University School of Medicine

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Long-Term Changes in Intelligence in Children at Risk

There is considerable evidence that adult schizophrenics suffer from a variety of cognitive deficits, not the least of which is an intellectual deficit (e.g., Pollack, Woerner, & Klein, 1968), and that they suffer a deterioration in several components of intelligence after the onset of psychosis (Lubin, Gieseking, & Williams, 1962).

Retrospective studies of the intellectual performance of children who later became psychotic adults have yielded evidence of early interference in the development of intelligence in future schizophrenics (Heath, Albee, & Lane, 1965; Lane & Albee, 1964; Offord, 1974; Pollack, Woerner, & Klein, 1970; Rappaport & Webb, 1950; Schaffner, Lane, & Albee, 1967). Despite some evidence to the contrary (Albee, Lane, Corcoran, & Wernecke, 1963; Lane & Albee, 1968), there is reason to conclude that intellectual deficit is an early concomitant of schizophrenia and is evident long before the emergence of adult illness (Lane & Albee, 1964, 1965).

In the last 15 years, investigators have begun examining the intellectual development of children of schizophrenic parents because these children are at risk for the development of schizophrenia or for other kinds of emotional or cognitive pathology. Whether or not the IQ scores of the offspring of psychotic parents are lower than those of the offspring of nonpsychotics is not clear. Some investigators have reported that there are no IQ differences between the children of schizophrenics and the children of normals (Cohler, Grunebaum, Weiss, Gamer, & Gallant, 1977; Rieder, Broman, & Rosenthal, 1977; Rutter, 1966; Worland &

Hesselbrock, 1980); but others report that the children of psychotic parents do have lower IQ scores than children of nonpsychotic parents (Landau, Harth, Othnay, & Sharfhertz, 1972; Mednick & Schulsinger, 1968).

Although not unequivocal, the results of past research suggest that the development of schizophrenia involves some degree of intellectual deterioration and that children of schizophrenic parents may be at risk not only for the development of psychosis but also for difficulties in the development of intelligence. Intellectual decline over time in a group of children at risk could indicate a disruption of cognitive development in a subsample of the children and also could be a warning signal for the beginning of a disease process to culminate later in recognizable adult psychosis. Thus, to understand the intelligence of children at risk from a developmental perspective is very important.

The purpose of the present study was to provide follow-up IQ data on a retested sample of offspring in the St. Louis Risk Research Project, from which comparisons of the IQ's of children of normal, physically ill, manic-depressive, and schizophrenic parents were previously presented (Worland & Hesselbrock, 1980), testing the following hypotheses. (1) Because we previously found no differences in IQ scores between the children of psychotic and children of nonpsychotic parents, we hypothesized that the IQ scores of the offspirng of psychotics would be no lower than those of the offspring of nonpsychotics when the follow-up data were considered. (2) We also hoped to determine whether our previously reported finding, that children of ill mothers had lower IQ scores than children of ill fathers, would remain true after an interval of from six to ten years.

(3) We also hypothesized that intelligence would be less stable over time for the children of psychotic parents than for the children of non-psychotic parents. We made the latter prediction due to the expected disruptive effects of emerging psychosis in a subsample of each of the risk groups.

Method

Subjects

The index parents were 24 psychiatric patients, described below, 15 physically ill parents, and 30 normal, nonhospitalized couples. These parents had 153 offspring of whom 10 were children of a schizophrenic parents, 20 were children of a parent with affective disorder, 17 had a parent with a schizoaffective disorder, 31 were children of a physically ill parent, and 75 were children of two parents with no psychiatric or prolonged hospitalizations for physical illness. Children were an average of 7.9 years when tested the first time, and averaged 15.6 years old at the second testing. Demographic statistics are in Table 1. Details about their families and the procedures involved in securing the participation

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Insert Table 1 about here

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of the families have been presented frequently elsewhere, and will not be repeated here to conserve space. See Anthony (1968); Janes, Hesselbrock, and Stern (1978); Worland et al. (1979); or Worland, Janes, and Anthony (Note 1) for more details.

Parental Diagnosis

To determine the parental diagnoses, one author (JW) read each psychotic parents' hospital index admission and discharge report, which had been edited to delete the hospital diagnoses and therapy regimens, and then made a DSM-III diagnosis (American Psychiatric Association, 1980) for each case. We had hospital records for 22 of 32 index parents that allowed for a psychotic diagnosis using DSM-III criteria. Eighteen offspring of the ten remaining cases were not used for these analyses. Because the 22 diagnosed cases represented a broad range of diagnoses, we grouped them into similar types for analysis. The DSM-III diagnoses, the groups into which they were aggregated, and number of offspring are presented in Table 2.

Insert Table 2 about here

Testing

The intelligence tests were administered individually for the first time to this sample between 1967 and 1972, during or shortly after the ill parents' hospitalization. We again tested offspring between 1975 and 1978. The tests used were the Wechsler Preschool and Primary Scale of Intelligence (WPPSI; Wechsler, 1967) and the Wechsler Intelligence Scale for Children (WISC; Wechsler, 1949) at the first assessment, and the Wechsler Intelligence Scale for Children - Revised (WISC-R; Wechsler, 1974) and Wechsler Adult Intelligence Scale (WAIS; Wechsler, 1955) at the second assessment, according to the age of the child. Tests were scored using the standard instructions. Eleven subscales were administered, including

Digit Span but excluding Mazes on the WISC and WISC-R.

Design of the Analyses

The main analysis reported here is based on the two testings of the offspring, using a repeated measures analysis of covariance, with parental diagnostic status used as the main effect, with socioeconomic status (SES; Hollingshead, 1968) at each testing used as covariates, and Verbal IQ (VIQ), Performance IQ (PIQ), and Full Scale IQ (FSIQ) treated as dependent variables. We computed three additional analyses of covariance that included the sex of the ill parent as a factor, deleting children of normal parents.

Results

Parental Diagnosis

The ANCOVA for VIQ yielded a significant time effect, F (1,147) = 12.81, $p<.0005$, and a significant time-by-parental diagnosis interaction effect, F (4,147) = 2.97, p = .0213. There were also highly significant time effects for PIQ, F (1,146) = 6.98, $p<.0091$; and for FSIQ, F (1,151) = 15.52, $p<.0001$. Main effects for parental diagnosis were not significant for any of the three dependent variables.

The significant time-by-parental diagnosis interaction effect for VIQ can be explained by noting that children of schizophrenics, children of parents with affective disorder, and children of physically ill parents all showed decreases in VIQ scores from the first to the second testing, while children of parents with schizoaffective disorders and children of normal parents had virtually no change in VIQ scores between the two testings (Table 3).

Insert Table 3 about here

Sex of Ill Parent

The main effects in the analyses of covariance for parental diagnostic group and sex of ill parent were not significant, for VIQ, PIQ, or for FSIQ. However, diagnosis-by-sex of ill parent interactions were significant for VIQ, F (3,69) = 6.89, p = .0004; for PIQ, F (3,69) = 3.80, p = .014; and for FSIQ, F (3,73) = 4.36, p = .007. The source of this interaction can be seen in the table of adjusted means (Table 4). For all three psychotic groups, children of ill mothers had lower scores than children of ill fathers, but the reverse was true for the children of physically ill parents. The three-way interaction, time-by-sex of ill parent-by-diagnosis, was nonsignificant for all three dependent variables.

Insert Table 4 about here

Stability of Intelligence

To test the hypothesis that intelligence would be less stable in the children of psychotics than in the children of nonpsychotics, stability coefficients were calculated separately for each diagnostic group for VIQ, PIQ, and FSIQ. The stability coefficient in this case is simply the correlation between a test at the first testing and the same test at the second occasion. These correlations are presented in Table 5. All the

Insert Table 5 about here

correlations were significant for children of parents with affective disorder, children of physically ill parents, and for children of normal par-

ents. However, intelligence scores were clearly less stable for children of schizophrenics and children of schizoaffectives and for each of these two groups, one of their three correlation coefficients was not statistically significant.

Discussion

As we hypothesized, we could find no difference in IQ scores between children of psychotic and nonpsychotic parents, although we did find that children of schizophrenics, children of parents with affective disorder and children of physically ill parents all had more loss in VIQ score between the first and second testing than did the children of schizoaffectives and children of normal parents. We had not predicted this finding. There has been considerable previous evidence that children of schizophrenics may have lower IQ scores than those of matched controls. For example, Watt, Grubb, and Erlenmeyer-Kimling (Note 2) found lower IQ in the offspring of one schizophrenic parent compared with the offspring of parents selected to control for socioeconomic status. Their findings as well as those of Weintraub and Neale (Note 3) and those reported by Mednick and Schulsinger (1968) provide evidence that parental schizophrenia may be associated with slightly diminished offspring IQ. As yet, however, none of the investigators who have reported lower IQ scores in children of schizophrenics has used DSM-III criteria for the parents' diagnoses, and none have reported whether the observed differences could have been a function of the sex of the psychotic parent. Consequently, the issue must remain unsettled until replicated studies using DSM-III criteria and testing for sex of the ill parent effects finally provide evidence that allows for a resolution of the matter.

When we compared the IQ scores of the offspring of ill fathers with

those of the offspring of ill mothers, we were unable to replicate our previous finding that the offspring of ill mothers had lower IQ scores than the offspring of ill fathers, regardless of whether the parent was hospitalized for psychosis or physical illness (Worland & Hesselbrock, 1980). Unlike our previous report in which we had found no interaction effect between parental diagnosis and sex of the ill parent, we found in the longitudinal analysis that the offspring with the lowest IQ scores were children of psychotic ill mothers and nonpsychotic ill fathers. This provides evidence that the effect of parental psychosis on offspring intelligence may depend upon whether it is the father or the mother who is psychotic. Previous reports that have yielded lower IQ scores in the offspring of schizophrenic parents have either studied samples exclusively composed of the offspring of psychotic mothers (Mednick & Schulsinger, 1968) or samples with a greater number of offspring of ill mothers than ill fathers (e.g., Erlenmeyer-Kimling's sample, from which the data reported by Watt, Grubb, & Erlenmeyer-Kimling [Note 2] were drawn), or report no information on the sex of the ill parents whose offspring are studied (e.g., Landau et al., 1972). Further efforts to understand the effects of parental psychosis on offspring intelligence should therefore include information on whether the mother or the father was the ill parent.

Our final hypothesis was partially substantiated. The stability of IQ scores was far greater in the two nonpsychotic control groups than in the psychotic groups, with the exception of the stability for children of parents with affective disorder, who had the highest Time 1/Time 2 correlations. If replicated, this pattern would indicate that parental

schizophrenic symptoms are associated with less stability in measures of offspring intelligence than parental affective symptoms. It still remains to be demonstrated that a lack of stability in these measures is associated with disturbance or emerging psychosis.

The stability coefficients might be challenged due to the small number of offspring involved in the analyses. We found large Time 1/ Time 2 IQ correlations in those groups with large n's, so it could be argued that the differences between correlations in the samples reflect greater sampling variability in the smaller groups rather than actual differences in the population correlations. In response to this suggestion, we note that the difference in n between the CAD group and the CSZAF group (20 vs. 17) could hardly be the explanation for the enormous difference in the reported correlations in these two samples (.872 vs. .471 for FSIQ). Consequently we consider it unlikely that these correlations are simply a reflection of different sample n's, and consider it more likely that the obtained correlations reflect real differences in the long-term stability of measures of intelligence in these samples.

Conclusions

This study warrants the following conclusions subject to the caution that the n's for the analyses are somewhat smaller than desirable. First, offspring of DSM-III defined schizophrenic, depressed, and schizoaffective parents do not differ from one another or from control offspring in IQ when social-class effects are controlled. Second, over the long term, offspring of mentally ill mothers may have continuing deficits in measures of their intelligence, when compared to the offspring of mentally

ill fathers. Finally, the offspring of schizophrenic and schizoaffective parents have less stability in measures of their intelligence than the offspring of affective disordered parents, physically ill parents, or normal parents.

Footnotes

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Requests for reprints may be sent to Julien Worland, Ph.D., Child Development Research Center, Washington University Medical School, 369 North Taylor Avenue, St. Louis, Missouri 63108.

[1]Currently at ECHO, St. Louis Children's Home, St. Louis, Missouri.

Reference Notes

1. Worland, J., Janes, C. L., & Anthony, E. J. The St. Louis Risk Research Project: Experimental Studies. Unpublished, 1980. (Available from J. Worland, 369 North Taylor Avenue, St. Louis, Missouri, 63108.)

2. Watt, N. F., Grubb, T., & Erlenmeyer-Kimling, L. Social, emotional and intellectual functioning at school among New York City children at high risk for schizophrenia. Paper presented to the Risk Research Consortium Plenary Conference, San Juan, Puerto Rico, 1980. In N. F. Watt, E. J. Anthony, L. Wynne, & J. Roff (Eds.) Children at risk for psychopathology. Cambridge University Press, in preparation, 1981.

3. Weintraub, S., & Neale, J. M. The Stony Brook High-Risk Project. Paper presented to the Risk Research Consortium Plenary Conference, San Juan, Puerto Rico, 1980. In N. F. Watt, E. J. Anthony, L. Wynne, & J. Roff (Eds.) Children at risk for psychopathology. Cambridge University Press, in preparation, 1981.

References

Albee, G. W., Lane, E. A., Corcoran, C., & Wernecke, A. Childhood and intercurrent intellectual performance of adult schizophrenics. Journal of Consulting Psychology, 1963, 27, 364-366.

Anthony, E. J. The developmental precursors of adult schizophrenia. Journal of Psychiatric Research, 1968, 6 (Suppl. 1), 293-316.

Cohler, B. J., Grunebaum, H. U., Weiss, J. L., Gamer, E., & Gallant, D. H. Disturbance of attention among schizophrenic, depressed and well mothers and their young children. Journal of Child Psychology and Psychiatry, 1977, 18, 115-135.

Heath, E. B., Albee, G. W., & Lane, E. A. Predisorder intelligence of process and reactive schizophrenics and their siblings. Proceedings of the 73rd Annual Convention of the American Psychological Association, 1965, 223-224.

Hollingshead, A. Two factor index of social position. In J. Myers and Y. L. Bean (Eds.), A decade later: A follow-up of social class and mental illness. New York: John Wiley & Sons, Inc., 1968.

Janes, C., Hesselbrock, V., & Stern, J. Parental psychopathology, age, and race as related to electrodermal activity of children. Psychophysiology, 1978, 15 (1), 24-34.

Landau, R., Harth, P., Othnay, N., & Sharfhertz, C. The influence of psychotic parents on their children's development. American Journal of Psychiatry, 1972, 129, 70-75.

Lane, E. A., & Albee, G. W. Early childhood intellectual differences between schizophrenic adults and their siblings. Journal of Abnormal and Social Psychology, 1964, 68, 193-195.

Lane, E. A., & Albee, G. W. Childhood intellectual differences between schizophrenic adults and their siblings. American Journal of Orthopsychiatry, 1965, 35, 747-753.

Lane, E. A., & Albee, G. W. On childhood intellectual decline of adult schizophrenics: A reassessment of an earlier study. Journal of Abnormal Psychology, 1968, 73, 174-177.

Lubin, A., Gieseking, C. F., & Williams, H. L. Direct measurement of cognitive deficit in schizophrenia. Journal of Consulting Psychology, 1962, 26, 139-143.

Mednick, S. A., & Schulsinger, F. Some premorbid characteristics related to breakdown in children with schizophrenic mothers. In D. Rosenthal (Ed.) The transmission of schizophrenia. Oxford: Pergamon Press, 1968.

Offord, D. R. School performance of adult schizophrenics, their siblings and age mates. British Journal of Psychiatry, 1974, 125, 12-19.

Pollack, M., Woerner, M. G., & Klein, D. F. IQ differences between hospitalized schizophrenic and personality-disorder patients and their normal siblings. Proceedings of the 76th Annual Convention of the American Psychological Association, 1968, 491-492.

Pollack, M., Woerner, M. G., & Klein, D. F. A comparison of childhood characteristics of schizophrenics, personality disorders, and their siblings. In M. Roff and D. F. Ricks (Eds.) Life history research in psychopathology, (Vol. 1). Minneapolis: The University of Minnesota Press, 1970, 208-225.

Rappaport, S. R., & Webb, W. B. An attempt to study intellectual deterioration by premorbid and psychotic testing. Journal of Consulting

Psychology, 1950, 14, 95-98.

Rieder, R., Broman, S., & Rosenthal, D. The offspring of schizophrenics. Archives of General Psychiatry, 1977, 34, 789-799.

Rutter, M. Children of sick parents. London: Oxford University Press, 1966.

Schaffner, A., Lane, E. A., & Albee, G. W. Intellectual differences between suburban preschizophrenic children and their siblings. Journal of Consulting Psychology, 1967, 31, 326-327.

Wechsler, D. The Wechsler Intelligence Scale for Children. New York: The Psychological Corporation, 1949.

Wechsler, D. Manual for the Wechsler Adult Intelligence Scale. New York: The Psychological Corporation, 1955.

Wechsler, D. Manual for the Wechsler Preschool and Primary Scale of Intelligence. New York: The Psychological Corporation, 1967.

Wechsler, D. Manual for the Wechsler Intelligence Scale - Revised. New York: The Psychological Corporation, 1974.

Worland, J., & Hesselbrock, V. The intelligence of children and their parents with schizophrenia and affective illness. Journal of Child Psychology and Psychiatry, 1980, 21, 191-201.

Worland, J., Lander, H., & Hesselbrock, V. Psychological evaluation of clinical disturbance in children at risk for psychopathology. Journal of Abnormal Psychology, 1979, 88 (1), 13-26.

Table 1

Demographic characteristics of children and families

	Index Parent Diagnostic Group[a]				
	SZ	AD	SZAF	PI	C
Children					
n	10	20	17	31	75
sex					
male	9	10	7	16	42
female	1	10	10	15	33
race					
white	10	7	12	14	52
black	0	13	5	17	23
age (months)					
X, time 1	96.40	108.50	86.56	88.40	95.37
X, time 2	186.00	204.85	173.17	193.47	183.40
Families					
SES[b]					
X, time 1	28.00	39.25	29.59	48.58	27.55
X, time 2	39.30	39.70	37.65	50.71	27.15
Ill parent					
father	8	8	4	18	--
mother	2	12	13	13	--

[a]SZ, schizophrenia; AD, affective disorder; SZAF, schizoaffective disorder; PI, physical illness; C, control.

[b]Hollingshead and Redlich (1968) 2-factor index of social position: Class I, 11-17; Class II, 18-27; Class III, 28-43; Class IV, 44-60; Class V, 61-77.

Table 2

Parental Diagnoses, Number of Families and Children,

and Groupings for Analyses

Group	DSM-III diagnosis	n	
		families	children
Children of Schizophrenics (CSZ)			
	1. Schizophrenic Disorder, Paranoid Type	1	2
	2. Schizophrenic Disorder, Residual Type	1	1
	3. Schizophreniform Disorder	1	3
	4. Acute Paranoid Disorder, Paranoid Disorder	2	4
Children of Affective Disorder (CAD)			
	5. Major Depression with Melancholia	2	6
	6. Major Depressive Disorder, Single Episode	1	3
	7. Bipolar Disorder	4	10
	8. Atypical Depression	1	1
Children of Schizoaffectives (CSZAF)			
	9. Major Depression with Psychotic Features; Schizoaffective Disorder	6	10
	10. Atypical Psychosis	3	8
Children of Physically Ill Parents		15	31
Children of Control Parents		30	75

Table 3

Group means for IQ measures at Phase I and Phase II,

by parental diagnostic status, adjusted for socioeconomic status

Group	VIQ		PIQ		FSIQ	
	1	2	1	2	1	2
CSZ	109.52	105.19	113.27	108.55	112.45	107.30
CAD	102.97	98.85	104.84	101.96	103.93	100.01
CSZAF	101.18	100.37	102.54	103.74	101.86	101.64
CPI	106.87	101.00	104.40	101.88	104.52	99.81
CN	109.06	109.30	110.10	108.39	110.53	109.74

Note: CSZ, children of schizophrenics; CAD, children of parents with affective disorder; CSZAF, children of schizoaffectives; CPI, children of physically ill parents.

Table 4

IQ score means, adjusted for SES,

for children psychiatrically and physically ill parents,

by sex of the ill parent

	CSZ		CAD		CSZAF		CPI	
	fa (8)	mo (2)	fa (8)	mo (12)	fa (4)	mo (13)	fa (17)	mo (13)
VIQ1	111.87	101.70	107.60	97.36	105.18	100.03	95.40	114.07
VIQ2	103.40	104.70	104.86	92.19	105.31	97.21	89.20	107.83
PIQ1	113.38	111.99	111.30	97.91	107.31	100.60	95.15	109.57
PIQ2	108.47	100.98	110.80	93.36	101.07	102.77	94.78	103.86
FSIQ1	113.81	107.92	110.57	97.03	106.50	100.37	95.32	109.71
FSIQ2	106.40	103.42	107.94	92.13	103.20	99.52	90.31	104.62

Note: CSZ, children of schizophrenics; CAD, children of parents with affective disorder; CSZAF, children of schizoaffectives; CPI, children of physically ill parents.

Table 5

Time 1/Time 2 correlations of intelligence measures, by group

Group	VIQ	PIQ	FSIQ
CSZ (10)	.519*	.310	.563*
CAD (20)	.849****	.855****	.872****
CSZAF (17)	.330	.446**	.471**
CPI (31)	.760****	.740****	.843****
CN (75)	.809****	.715****	.838****

Note: CSZ, children of schizophrenics; CAD, children of affective disorders; CSZAF, children of schizoaffectives; CPI, children of physically ill; CN, children of normals

* $p<.05$
** $p<.025$
**** $p<.005$